CLAIMS

What is claimed is:

1   1.   A method for enhancing the broadcast of a live event,
2   comprising the steps of:
3   capturing first video using a first camera;
4   sensing field of view data representing a field of view of said first
5   camera;
6   determining a position and orientation of a video image of a target in
7   said captured video at least partially based on recognizing one or more portions
8   of said video image of said target in said captured video; and
9   modifying said captured video data by enhancing at least a segment of
10   said video image of said target.

1   2.   The method according to claim 1, wherein said step of
2   determining a position includes the steps of:
3   determining a rough estimate of said position of said target in said
4   captured video using said field of view data; and
5   determining a more precise estimate of said position of said target in
6   said captured video using a pattern recognition technique.

1   3.   The method according to claim 1, further including the step of:
2   determining whether said target is within said field of view of said first
3   camera.

1   4.   The method according to claim 1, wherein:
2   the step of determining is also at least partially based on comparing said
3   field of view data to prestored location data for said target.

1   5.   The method according to claim 1, wherein:

2   said step of modifying replaces a first advertisement with a second

3 advertisement.

1   6.   The method according to claim 1, wherein:

2   said step of modifying replaces an image of a surface in a stadium with

3 an advertisement.

1   7.   The method according to claim 1, wherein:

2   said step of modifying includes highlighting a portion of a playing field.

1   8.   The method according to claim 1, wherein:

2   enhancing said video image of said target does not include

3 replacing said video image of said target; and

4   said method further including the step of accounting for

5 occlusions.

1   9.   The method according to claim 1, further including the steps of:

2   capturing second video using a second camera, said second video

3 including said target, said second camera zoomed such that said target

4 substantially fills most of said second camera's field of view;

5   detecting an occlusion of said target in said second video; and

6   using said detection of said occlusion from said second video to

7 determine where said occlusion is positioned in said first video;

8   said step of modifying said first video does not replace said occlusion.

1   10.   The method according to claim 1, further including the steps of:

2   storing said target's location before said step of capturing; and

3   storing an unoccluded image of said target before said step of capturing.

1   11. A method according to claim 1, further including the step of:

2   learning changes to said target image.

1   12. The method according to claim 1, further including the steps of:

2   comparing said video image of said target in said captured video with

3 a video image stored in a memory; and

4   updating said memory to include a revised image of said target.

1   13. A method for enhancing the broadcast of a video image of a

2 target at a live event, comprising the steps of:

3   capturing a frame of video using a first camera;

4   sensing an electromagnetic signal transmitted from said target, said

5 electromagnetic signal not being visible to the human eye;

6   determining a position and orientation of said video image of said target

7 in said frame of video, at least partially based on said electromagnetic signal;

8 and

9   modifying said video data by enhancing at least a segment of said video

10 image of said target.

1   14. A method according to claim 13, wherein:

2   said step of determining includes determining the pixel position of the

3 target in said sensor frame of data.

1   15. A method according to claim 13, wherein

2   said electromagnetic signal is an infrared signal.

1   16.   A method according to claim 13, further including the step of:

2   storing data, based on said electromagnetic signal, that has a value

3   greater than a predetermined threshold.

1   17.   A method according to claim 13, further including the step of:

2   ignoring data from said electromagnetic signal if sensed during a flash.

1   18.   A method for enhancing the broadcast of a target at a live event,

2   comprising the steps of:

3   capturing a first frame of video using a first camera;

4   capturing a second frame of video using a second camera, said second

5   frame of video including said target;

6   determining if said target is within said first frame of video;

7   determining a position and orientation of said target in said first frame

8   of video;

9   detecting an occlusion of said target in said second frame of video;

10   determining where said detected occlusion is positioned in said first

11   frame of video at least partially based on said step of detecting; and

12   modifying said first frame of video by enhancing said target in said first

13   frame of video without enhancing said detected occlusion.

1   19.   A method according to claim 18, wherein:

2   said second camera is pointed at said target and is located substantially

3   adjacent said first camera;

4   said step of detecting an occlusion includes comparing at least a portion

5   of said second frame of video to an unoccluded image of said target.

1 20. A method according to claim 19, wherein:

2 said second camera is zoomed such that said target fills a substantial

3 portion of said second frame of video.

1 21. A method according to claim 19, further including the steps of:

2 storing said unoccluded image of said target prior to said step of

3 capturing said first frame of video; and

4 updating said stored unoccluded image of said target if lighting

5 conditions change.

1 22. A system to be used with a first camera for enhancing the

2 broadcast of a target at a live event, comprising:

3 one or more field of view sensors coupled to said camera such that said

4 one or more field of view sensors can detect field of view data representing said

5 first camera's field of view;

6 memory storing a location of said target; and

7 one or more processors, in communication with said memory and said

8 one or more field of view sensors, said one or more processors programmed to

9 determine whether said target is within the field of view of said camera and to

10 determine where said target is positioned within a frame of video of said first

11 camera.

1 23. A system according to claim 22, wherein:

2 said memory stores data representing a video image of said replacement

3 graphic.

1 24. A system according to claim 22, further including:

2   a video modification unit, in communication with said one or more

3   processors, for modifying said frame of video to enhance at least a section of

4   said video image of said target with a replacement graphic.

1   25.   A system according to claim 24, wherein:

2   said video modification unit is a linear keyer.

1   26.   A system according to claim 24, wherein:

2   said video modification unit is a processor.

1   27.   A system according to claim 24, wherein:

2   said video modification unit highlight a portion of a football field.

1   28.   A system according to claim 24, wherein:

2   said video modification unit replaces a first billboard with a second

3   billboard.

1   29.   A system according to claim 24, wherein:

2   said video modification unit adds a first billboard to said frame of video.

1   30   A system according to claim 22, wherein:

2   said one or more field of view sensors includes a pan sensor, a tilt

3   sensor and a zoom sensor.

1   31.   A system according to claim 22, further including:

2   a second camera pointed at said target, in communication with said one

3   or more processors and located substantially adjacent to said first camera.

1   32.   A system according to claim 22, further including:

2   a video control in communication with said first camera and said one or

3   more processors;

4   a video mixer in communication with said second camera and said one

5   or more processors; and

6   a video delay unit in communication with said video control and said

7   video modification unit.

1   33.   A system for enhancing the broadcast of target at a live event,

2   comprising:

3   a plurality of broadcast cameras;

4   a plurality of field of view sensors, each sensor coupled to one of said

5   broadcast cameras;

6   a multiplexer in communication with said field of view sensors for

7   selectively transmitting a signal from one of said field of view sensors;

8   a video delay unit;

9   a video control unit in communication with said broadcast cameras, said

10   video control unit selectively transmits to said video delay unit a signal from

11   one of said broadcast cameras;

12   a plurality of dedicated cameras with a fixed field of view and pointed

13   at one of said plurality of targets, each dedicated camera located substantially

14   adjacent to a broadcast camera;

15   a video mixer in communication with said video control unit and said

16   dedicated camera for selectively transmitting a signal from one of said dedicated

17   cameras, said selected one of said dedicated cameras being substantially

18   adjacent to said selected one of said broadcast cameras;

19   memory storing the location of said targets;

20	one or more processors, in communication with said memory and said
21	multiplexer, said one or more processors receives said selected signal from said
22	video control unit, said one or more processors programmed to determine
23	whether one of said targets is positioned within the field of view of one of said
24	broadcast cameras and to determine where said one target is within a frame of
25	video of said one broadcast camera;
26	a video modification unit, in communication with said one or more
27	processors, for modifying said frame of video to enhance at least a section of
28	said video image of said target with a replacement graphic.

1	34. A system, to be used with a first camera, for enhancing the
2	broadcast of a live event, comprising:
3	a target including an electromagnetic transmitter;
4	a sensor adapted to receive an electromagnetic signal from said target,
5	said electromagnetic signal is not visible to a human eye;
6	a memory storing the location of said target;
7	one or more processors, in communication with said memory and said
8	sensor, said one or more processors programmed to determine whether said
9	target is within the field of view of said first camera and to determine where
10	said target is within a frame of video of said first camera.

1	35. A system according to claim 34, further including:
2	a video modification unit, in communication with said one or more
3	processors, for modifying said frame of video to replace at least a section of
4	said video image of said target with at least a replacement graphic.

1	36. A system according to claim 34, wherein:
2	said electromagnetic signal is an infrared signal.